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IDENTIFICATION OF MOVEMENT STRATEGIES DURING THE SIT-TO-WALK MOVEMENT IN PATIENTS WITH KNEE OSTEOARTHRITIS

D. S. Komaris, C. Govind, P. Riches, A. Murphy, A. Ewen, F. Picard, J. Clarke

Abstract

Patients with osteoarthritis (OA) of the knee commonly alter their movement to compensate for deficiencies. This study presents a new numerical procedure for classifying sit-to-walk (STW) movement strategies.

Ten control and twelve OA participants performed the STW task in a motion capture laboratory. A full body biomechanical model was used. Participants were instructed to sit in a comfortable self-selected position on a stool height adjusted to 100% of their knee height and then stand and pick up an object from a table in front of them. Three matrices were constructed defining the progression of the torso, feet and hands in the sagittal plane along with a fourth expressing the location of the hands relative to the knees. Hierarchical clustering (HC) was used to identify different strategies. Trials were also classified as to whether the left (L) and right (R) extremities used a matching strategy (bilateral) or not (asymmetrical). Fisher's exact test was used to compare this between groups.

Clustering of the torso matrix dichotomised the trials in two major clusters; subjects leaning forward (LF) or not. The feet and hands matrices revealed sliding the foot backward (FB) and moving an arm forward (AF) strategies respectively. Trials not belonging in the AF cluster were submitted to the last HC of the fourth matrix exposing three additional strategies, the arm pushing through chair (PC), arm pushing through knee (PK) and arm not used (NA). The control participants used the LF+FBR+PK combination most frequently whereas the OA participants used the AFR+PCL. OA patients used significantly more asymmetrical arm strategies, $p=0.034$.

The results demonstrated that control and OA participants favour different STW strategies. The OA patients asymmetrical arm behaviour possibly indicates compensating for weakness of the affected leg. These strategy definitions may be useful to assess post-operative outcomes and rehabilitation progress.